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ABSTRACT

These selected readings are designed to supplement James Gillespie's "Modern Livestock and Poultry Production" (2nd edition) as the student reference for the advanced beef unit. The 15 lessons build on Agricultural Science I and II competencies. Topics of the 15 lessons are: importance of the beef enterprise; cost of beef production; types of markets; marketing options; production strategies; local, state, and federal regulations; governmental programs; associations and organizations; breeding stock selection; breeding systems; beef facilities; beef herd health programs; and pasture and roughage program. (YLB)

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Advanced Beef Unit

for

Advanced Livestock Production Curriculum

Selected Readings

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ADVANCED BEEF UNIT

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A technical review of Lesson 13, Beef Herd Health Programs, was conducted by Bonnard Moseley of the University of Missouri-Columbia's Extension and Continuing Education staff. The selected readings was reviewed by Ron Morrow of the Department of Animal Sciences, University of Missouri-Columbia.

Special recognition is also given to Harley Schlichting, director, and his staff at the Instructional Materials Laboratory for the typing and illustrating of this unit.

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FOREWORD

This selected readings is designed to supplement James Gillespie's Modern Livestock and Poultry Production, 2nd ed., as the student reference for the Advanced Beef unit. It will also be of value to those seeking a more in-depth understanding of a beef enterprise.

In all, 15 lessons build on Agricultural Science I and II competencies. Topics covered include beef enterprise importance, costs, marketing options, production strategies, government involvement, breeding stock, facilities, herd health and feedstuffs.

Persons using this selected readings on an individual basis may wish to secure a copy of the instructor's guide for additional materials on beef production.

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ADVANCED BEEF

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The beef cow is a vital part of agriculture. She converts unmarketable resources such as grass, roughage and by-products into an edible, salable product--beef. It may be commonplace to read world population and food conference reports predicting that mankind will soon have to substitute meat with grain protein. But there are two major reasons why Old Bossy is pretty likely to remain.

Begin with the economic factor that often needs explaining even to the well-meaning but misinformed humanitarian. There are millions of acres around the globe that are too arid, rocky or poor to support anything other than grass or trees. Animals like the cow, goat and sheep can convert this grass into an edible cash product. The second reason is the consumer. As soon as human beings rise above a subsistence income level, most want meat in their diets. For many, the center of a good meal is the meat dish.

While it's not time to start "singing the blues" for the beef cow or her keeper as vanishing species, nostalgic memories of the cowboy riding in from the range at sunset do not reflect the cattle industry today, either. A cow enterprise is a business, regardless of the producer's goal. Its objective is to put meat on the table at a price most people can afford while still clearing enough profit for the producer to make a decent living.

Missouri Advantages

Old Bossy doesn't allow much profit margin. For the weekend farmer or the full-time producer, she can lose a buck as easily as she can make one. But Missouri is especially well adapted for a successful beef enterprise due to its environment, location and land. Rainfall and temperatures in the state are usually adequate for high grass yield. Missouri is a relatively high grain-producing state and is bordered by several other high grain-producing states. Finally, Missouri has many acres of less expensive land that is unsuitable for cropping due to slope, shallowness or lack of fertility.

Beginning an Enterprise

As much as is practical, choose livestock enterprises which best fit the cropping system. The most common reason for including livestock in the farm organization is to increase net farm income. This can be accomplished in several ways.

1. Marketing crops through livestock at higher returns than could be obtained if the crops were sold
2. Keeping year-round farm labor fully and profitably employed throughout the year
3. Providing a market for pasture and other crop by-products that otherwise could not be marketed.

Annual net income for livestock enterprises varies greatly from year to year and in requirements for labor, buildings, equipment, management intensity and

proportional amounts of grain and forage investment. Consider these factors when selecting a livestock enterprise.

1. Amounts of pasture, hay, and grain and forage crops
2. Regularity and stability of net income
3. Amount of labor available
4. Distribution of labor requirements for livestock during the year, as compared to crop labor requirements
5. Manager skill and personal likes
6. Available markets
7. Capital requirements and rapidity of capital turnover
8. Available facilities

Credits

University of Missouri-Columbia Extension Division agricultural publications

a) M75: Missouri Farm Planning Handbook (1986)
b) M104: Beef Cow-Calf Manual (1982)

Types of Beef Enterprises

Cow-calf - Whether a purebred or commercial herd, a beef cow enterprise is adapted to large and medium-sized farms. Even farms with a high percentage of row crops generally have some acreage which must remain in permanent pasture. A cow herd can practically use this non-salable pasture, stalk fields and meadow growth after hay is harvested. Capital turnover is slow, but the risk, labor need and required investment are low. It is difficult to achieve a satisfactory net income on farms where a beef cow herd is the only source of income, however.

Stocker - This enterprise is sometimes referred to as backgrounding. Cattle are fed a growing rather than finishing ration, and the enterprise is suited to grazing or feeding a high roughage ration.

Feeder - Several cattle feeding systems are adapted to farms which produce large amounts of grain and smaller amounts of high-quality roughage. Immediate finishing requires choice, quality calves; facilities for feeding; and above-average skill in buying and selling. The cost of gains is relatively high, especially with long feeding periods, and risk is high when prices drop.

Yearling steers can utilize large amounts of grain and are somewhat risky because of price fluctuations. Compared to calves, steers usually have a lower death rate and require less management skill. Turnover is quick, and good management is required for procurement, production and marketing.

A deferred finish program provides cattle a growing period before the finishing ration. Cattle are generally retained after a stocker or backgrounding program. Where silage or suitable high-quality roughage is available, cheap winter gains can lower the risk.

Fixed and Variable Costs

Fixed costs are those costs which are unrelated to output volume and are incurred just because of being in business. Also known as ownership or overhead costs, fixed costs include depreciation on facilities, breeding stock and equipment; loan interest (land, facilities, livestock purchase, equipment); opportunity costs; and insurance. Other fixed costs include repairs that are incurred whether or not the item is used and property taxes, equipment, facilities and cattle. Insurance costs cover fire, theft, lightning and liability areas.

Variable costs are those that change as production varies over a period of time. They include livestock, purchased feed, machinery, veterinary services and medicine, utilities and raised feed (seed, fertilizer, herbicides, pesticides, fuel, labor).

Credits

University of Missouri-Columbia Extension Division agricultural publications

a) M65: Missouri Cattle Feeders Manual (1983)
b) M75: Missouri Farm Planning Handbook (1986)

The beef producer has several options for marketing cattle: local and regional markets, direct sales, graded cattle markets and video auctions. The benefits and drawbacks of each of these markets must be weighed before the most profit can be realized. Some of these options are discussed here.

Graded Cattle Markets

In graded feeder cattle auctions, all cattle are divided by specific grade into pens or lots. The cattle are then offered for auction by their grade, rather than by producer grouping. This allows the small operator the same price advantages that large operators receive in other auctions since the buyer is offered a group of uniform, quality cattle. Cattle feeders are given an opportunity to purchase feeder calves of specified quality and quantity, while saving the time and expense of shopping around.

Disadvantages to these auctions are similar to other auctions which involve a lack of cattle or buyers. If there is a small number of cattle offered for sale, buyers may not be attracted to the auction. In contrast, an auction with many cattle but few buyers will also result in low prices. Buyers like to purchase truckloads of a single quality grade, and a limited number of a quality grade may cause a lower price for the cattle.

Slaughter cattle can also be sold by yield and grade. This may be advantageous for producers in some situations. A producer can receive a better return when producing quality animals that naturally have a high percentage of lean cuts. Producers raising cattle with higher-than-normal amounts of lean cuts due to special feeding programs can also profit with grade and yield sales.

Grade and yield markets are usually located near population centers and may necessitate more time in shipping. In some situations, auction prices can equal carcass prices when the dressing percentage is considered.

Video Auctions

Electronic innovations in recent years have affected the process of feeder calf marketing. A video auction involves showing to potential buyers a 2-4 minute videotape of the cattle offered for sale. The visual portion of the tape shows the cattle at the seller's farm or ranch. At the same time, the audio portion describes weight, weighing location, background information and various delivery date options. After showing the videotape, the auctioneer sells the cattle to the highest bidder. Together, the buyer and seller arrange for the shipping after the cattle are sold.

The video auction serves three purposes in the industry. First, it allows the producer to set the sale conditions. Second, the cattle can be observed in their original situations. Finally, it allows the cattle to remain in one location until after they are sold, reducing stress. In general, the video auction provides for less stress on the cattle and convenience for the buyer and seller.

Credits

Taylor, Robert E. Beef Production and the Beef Industry: A Beef Producer's Perspective. Minneapolis, Minn.: Burgess, 1984, pg. 407.

"Seller, Buyer and Marketer Agree: Video Auctions Are a Workable Sales Tool," Beef Magazine. April 1984: 72, 77.

When evaluating markets for the best prices, the producer needs to ask questions such as "How can the prices be improved?" and "How can the herd be made 'special' for better returns?" In general, producers can realize more profits through better marketing and promotion for buyers and consumers.

Futures Market Affects

Although the futures market is separate from the live cattle market, there are definite connections between the two. The futures market affects the feeder cattle market by providing expectations to buyers. For example, some buyers may look at futures to predict the live market price at slaughter time, while others guarantee their selling price through hedging. These buyers can then determine their top price for feeders, as well as their estimated cost of production. In some situations, the live market price can be influenced by a need for cattle to fill futures contracts. Finally, the grain futures market can influence the price a cattle buyer will pay because of the effect on production costs.

Beef Industry and the Consumer

The ultimate market for beef is determined by the consumer, who sets prices with shopping habits and preferences. Studies show that meat shoppers can be divided into attitudinal segments. One group of consumers makes meat selections with regard for health-related issues. Shoppers with an active lifestyle base their food selections largely on speed and ease of preparation, although there is a high degree of concern about nutrition. Some consumers are price-driven, and they make their food purchases strongly based on price. The attitudinal group that tends to be composed of the oldest members is the creative cooking group. This segment enjoys meal preparation and has a relatively high level of concern about nutrition. Finally, there are meat lovers, who base purchases on preference to the product. These attitudes must be considered by the beef industry to successfully market products.

To maintain or increase consumer demand for beef, the industry must provide a quality product for educated consumers that accommodates their lifestyles. Recently, this attempt has been made by offering lean beef, developing well-defined quality grades, providing name-brand beef and carefully using medicines and chemicals. The industry seeks to educate the consumer by labeling, branding and advertising to emphasize the good qualities of beef.

Some changes must be made to meet the consumer's changing lifestyles. The number of one- and two-person households is increasing, and the trend is expected to continue. Many consumers now live a very active lifestyle with little time for food preparation, but they want products at reasonable prices. Packaging and product development are areas that may help market quality beef to discriminating consumers.

Strategies for Seedstock Producers

Seedstock producers have the additional expense of promoting and marketing cattle. These producers attempt to supply genetically, structurally and productively superior cattle for other seedstock and commercial producers. Seedstock producers often gain recognition through advertising and participation in activities that spotlight their cattle.

Advertising costs and methods vary widely and should be chosen to fit each situation. Large seedstock producers with potential buyers across the country may choose to advertise in national breed publications, while others find their dollars more wisely invested in state breed association magazines or newsletters. Another possible advertising opportunity is in general farm and ranch magazines. Other promotional dollars can be invested in local newspaper and radio station ads, farm signs and personal letters accompanied by sale bills to previous and potential buyers. Finally, seedstock producers can gain needed recognition and reputation enhancement through participation in shows, performance tests, breed sire summaries and central bull testing stations.

Credit

Neumann, A. L.; Keith S. Lusby. Beef Cattle, 8th ed. New York: John Wiley & Sons, Inc., 1986, pg. 45-46.

"Consumer red meat attitude worsens." Beef. Oct. 1985: 9-10.

A producer interested in finishing cattle wants to receive as large an income as possible while considering efficiency and profits. To accomplish this goal, a number of production strategies should be taken into consideration.

Spayed Heifers

Spaying heifers (removing the ovaries) prevents pregnancy and makes heifers adaptable to more management systems as feeder cattle. However, spayed heifers do not gain as quickly or as efficiently as intact heifers. This is to be expected since ovaries produce sex hormones which stimulate growth and improve feed conversion. Spayed heifers and intact heifers show equal performance when implanted with growth promotants such as Synovex-H or Ralgro. Spayed heifers do not respond to MGA, however.

Because of the cost, infection risk and considerations mentioned, spaying feedlot heifers is not a common practice.

Implants and Feed Additives

Implants - Weaning weights and feeders' gaining rate and efficiency can be increased when using implants. Research indicates that the use of implants improves the weaning weights of beef cattle by 10-35 pounds. Implants have increased rate-of-gain by 8-10% and feed efficiency by 6-10% when cattle were fed growing and finishing rations.

Be certain to follow label instructions for implanting technique, level of application and withdrawal times before slaughter. Table 6.1 shows limitations on implant usage.

TABLE 6.1 - Restrictions on the use of implants

Trade name	Dosage	Effective days	Withdrawal days[1]	Type animal approved
Compudose	24 mg	200	0	Steers--birth through feedlot
Ralgro	36 mg	90-120	65	Steers and heifers, birth through feedlot
Steer-oid	220 mg	90-120	0	Steers over 400 lbs.
Synovex-S	220 mg	90-120	0	Steers over 400 lbs.
Synovex-H	220 mg	90-120	0	Heifers over 400 lbs.
Synovex-C[2]	110 mg	90-120	0	Steer and heifer calves over 45 days of age

[1] Minimum number of days animal may be implanted before slaughter.
[2] This implant has been approved for breeding animals.

MGA - Melengestrol acetate (MGA) is a feed additive approved by the FDA for use in supplements fed to heifers in the feedlot or on pasture. It is a

synthetic hormone similar in structure and activity to progesterone, the natural pregnancy hormone.

MGA suppresses heat and improves rate-of-gain and feed use in heifers. In 40 feedlot trials with heifers, MGA showed an increase of 10.3% for average daily gain and 6.5% for feed conversion. There was no significant change in carcass quality in heifers that were fed MGA.

This additive is approved for feeding 0.25-0.50 mg daily per head. Side effects are not a problem. A 48-hour withdrawal before slaughter is required. If withdrawal is longer than 72 hours, some heifers will come in heat, and the resulting excitement can cause a weight loss. MGA is not effective for steers, spayed heifers or pregnant heifers.

Inophores - Rumensin^{R} and Bovatec^{R} are inophores cleared for use in cattle feeds. Inophores are polyether antibiotics that transport ions across biological membranes, such as cell walls. This action is associated with the effect on rumen microorganisms and other biological systems.

Rumensin^{R} and Bovatec^{R} improve the efficiency of rumen fermentation by increasing the propionate-to-acetate ratio, which reduces energy losses associated with volatile fatty acid production in the rumen. Research is not clear about the cause of Rumensin^{R} and Bovatec^{R} response in beef cattle rations.

Both these inophores improve the feed efficiency of cattle fed high grain or high roughage rations. Both increase the rate-of-gain for cattle fed high roughage rations and, to a lesser extent, cattle fed high grain rations. Rumensin^{R} usually reduces the feed intake of cattle full-fed high grain rations, however, so that little rate-of-gain increase occurs. Both ionophores reduce grain bloat and legume bloat and give some coccidiosis control for beef cattle, although clearances for Rumensin^{R} and Bovatec^{R} make no claims for bloat or coccidiosis control. Neither ionophore requires a withdrawal period before slaughter.

Rumensin^{R} is toxic to horses and may be to swine. Horses and swine should, therefore, not have access to cattle rations containing Rumensin^{R}.

As of early 1987, Bovatec^{R} had not been cleared for feeding with antibiotics. Bovatec^{R} has not been approved for breeding animals or cattle on pasture, although it is cleared for use in liquid supplements.

Antibiotics - An antibiotic is a compound that inhibits the growth of other organisms. The primary function of antibiotics is disease control, but they can have a secondary effect on the nutrition of farm animals. The way that antibiotics act in feed is not yet fully understood.

In addition to improving the general health of animals, antibiotics may suppress harmful organisms in the digestive tract, reducing competition for nutrients between these organisms and the host animal. When cattle are fed a low roughage diet, they can be affected by rumen parakeratosis, a lack of stimulation to the rumen wall that leads to infections. Bacteria from these infections can travel through the bloodstream to the liver, where they cause

abscesses that reduce cattle performance. Some of the beneficial effects of antibiotics may be caused by the healthier state of the digestive tract's mucosal lining, which improves the absorption of nutrients and prevents the passage of harmful bacteria across the digestive tract wall.

Not all experiments have shown a response from the inclusion of antibiotics in cattle rations, and the magnitude of response has varied widely. Benefits are usually greater when control animals have a low level of performance or during times of stress, such as after weaning, during shipping or when cattle are first started on feed. Another drawback is that some antibiotics require withdrawal times before slaughter.

The practice of feeding low-level antibiotics to cattle has come under criticism recently. Some scientists fear this will lead to development of drug-resistant strains of harmful microorganisms in animals and humans, although there is little scientific support for this theory. For this reason, antibiotics used in cattle rations are **not** used in human medicines. All regulations should be followed when using antibiotics, including withdrawal times. These precautions provide for a safe, quality product and promote goodwill between the industry and the consumer.

Buffers - Buffers are solutions containing both weak acids and their salts. They resist changes in pH when either acids or alkalis are added to them. Large quantities of organic acids are produced in the rumen by microbial fermentation. Saliva is the principal source of rumen-buffering agents. Buffering agents are most likely to be needed in the diet when beef cattle are fed high silage or high concentrate diets. Silages are high in organic acids. High energy diets are digested quickly in the rumen and rapidly lower rumen pH. Also, saliva flow is decreased with high moisture and high energy, low roughage diets.

Results with buffers in the diets of ruminants lack uniformity. Feed intake, daily gain and feed efficiency have been improved in some studies, but not in others.

Retained Ownership

Retained ownership involves the integration of two or more phases of the industry. For example, a cattle producer with a cow-calf operation can retain ownership of the calves through the stocker phase and sometimes the feedlot phase. There are some logical advantages to this type of operation. Those cattle producers with superior calves (genetic, health or management backgrounds) that perform better may not be able to realize these advantages in the feeder market. Additional pounds of gain from the later feeding phases can be used to cover high investment and operating costs. Other advantages are that cattle are not exposed to the stresses of marketing between feeding phases and that cattle can be marketed in the more stable slaughter cattle market, rather than the feeder calf market.

Some benefits of retained ownership can be realized with the use of custom feedlots, where the producer maintains ownership through the feeding phases. In this system, the feedlot operator is paid by the cattle owner to feed the

cattle. This eliminates or reduces cattle cost for the feedlot operator and facility costs for the producer.

As with any program, there are disadvantages as well as advantages; the disadvantages of retained ownership are closely related to the longer ownership period. First, because cattle are owned for longer periods, there is a longer time between investment and marketing. Second, the longer ownership period allows more time for the cattle to contract health problems. Finally, this system requires more operating capital to meet the enterprise requirements over the longer time period. The combination of these factors can lead to tax complications in starting a program that involves retained ownership.

Credits

UMC Extension Division agricultural guides

a) G2075: Feed additives for beef cattle (1984)
b) G2082: Heifers vs. steers in the feedlot (1983)
c) G2090: Growth stimulants (implants) (1984)

Neumann, A. L.; Keith S. Lusby. Beef Cattle, 8th ed. New York: John Wiley & Sons, Inc., 1986, pg. 7-8, 207-208.

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Science and Technology

GUIDE

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EXTENSION CONTINUING EDUCATION The State is the Campus

Stockmen's Liability Under the Missouri Nuisance Law

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There is no one thing a stockman can do and gain absolute protection under the nuisance law. Thus you must attempt to prevent such lawsuits from arising. This implies that those who follow a "good neighbor" policy are less likely to be sued. Try to avoid causing your neighbors discomfort.

This Guide only discusses some general principles affecting the civil liability of feedlot operators under the nuisance laws. If you are faced with a potential air or water pollution problem, don't hesitate to discuss it with your attorney. Technical information on constructing lagoons and other pollution control facilities can be obtained through your local University of Missouri Extension Center. Additional information on water pollution can be found in UMC Guide 850, "Water Pollution Laws and Regulations."

Pollution of water and air caused by the raising of cattle, swine, poultry, and other domestic farm animals in confinement systems is a very real problem. Whether conditions arising from any particular operation constitute a *nuisance* is a question of fact and depends on the circumstances of each case. Should the conditions be found to constitute a nuisance, damages and/or an injunction are the legal remedies and are determined by the courts.

The purpose of this publication is to discuss general aspects of lawsuits for nuisances and to emphasize the importance of taking steps to prevent such lawsuits from arising.

What Is A Nuisance?

A nuisance is essentially an unreasonable interference by one person's use of his property with the use and enjoyment of another's property. Typical unreasonable uses are those producing foul odors, water pollution, loud and recurring noises, and physical conditions amounting to a health hazard. The defendant (the person being sued) counters by arguing that the animal operation is his livelihood. To close down his operation would cost him thousands of dollars invested in buildings and equipment which cannot readily be converted to another agricultural use. The defendant argues that it is not fair to shut down his operation.

But what is "fair"? Should the complaining party be forced to continue living under allegedly undesirable conditions? Should the farmer be forced to close down his livestock operation and lose a substantial investment? Obviously, the court's decision may work a hardship on one of the parties. To generalize what is fair in all cases is impossible. Instead, the circumstances of each case determine which party has the greatest interest. As the circumstances change, the legal result may also change.

Legal Remedies In A Nuisance Lawsuit

In a nuisance lawsuit the complaining party (the plaintiff) may ask for (1) an injunction, (2) damages (either actual or punitive), or (3) both an injunction and damages.

A lawsuit for an injunction is referred to as an equitable action. This means that the primary factor determining whether the court will close down an animal operation is fairness to both parties. The court must go through a process

*This is a revision of the Guide prepared originally by Donald R. Levi and John C. Holstein. Some sections of this revision appear essentially unchanged. Thus, a heavy debt is acknowledged to Levi and Holstein.

of weighing the interests of both parties in deciding which has the greatest interest. In essence, the court must balance the relative hardships involved between closing down the defendant's operation and forcing the plaintiff to live in undesirable conditions.

Injunctions are of two basic types: temporary and permanent. Where the farmer simply needs more time to alleviate the nuisance-causing condition, courts are prone to grant an injunction of a temporary nature. Once the nuisance has been eliminated, the court reviews its injunctive order and, if the court agrees that the proposed use is reasonable, allows the farmer to resume his enterprise. Where the farmer is unable to alter his operation to make it less objectionable, a permanent injunction is sometimes appropriate. Partly because of the severity of a permanent injunction, courts have been reluctant to permanently enjoin a farmer's operation.

Many petitions for injunctive relief are accompanied by a separate request for actual and perhaps punitive damages. By seeking actual damages, the plaintiff wants reimbursement for his out-of-pocket expenses and property losses. Basically, actual damages reflect any decrease in property values which result from the nuisance condition. Punitive damages, on the other hand, are awarded on account of the defendant's malicious conduct (legal malice).

Legal malice is basically defined as the doing of a wrongful act intentionally without just cause or excuse. For example, you might be liable for punitive damages if you could have altered your method of operation at little or no cost and thereby prevented any damage to your neighbors. In general, if your management practices are far from ideal, it is possible that punitive damages may be assessed against you.

Nuisances: Permanent vs. Temporary

A temporary nuisance is one which is abatable. For example, a farmer might be able to make his animal operation less objectionable to his neighbors by constructing lagoons, spraying for flies, or hauling manure more frequently. Should a farmer be sued for a temporary nuisance, he is liable in damages for the inconveniences that the complaining party has suffered in the past. If the farmer fails to take steps to abate the nuisance, he can be sued by the same plaintiff for damages arising since the previous lawsuit.

A farmer may periodically find himself defending a lawsuit if he fails to abate the nuisance condition. Thus, the farmer is encouraged to alter his management practices in order to avoid being sued again.

A nuisance which is not abatable is known as a permanent nuisance. All damages—both past and future—can be awarded the complaining party in one lawsuit because nothing can be done to relieve the inconvenience being suffered by the complaining party. The same plaintiff cannot later sue the farmer.

The court determines whether an operation constitutes a temporary or a permanent nuisance. This classification may have a decided influence on the farmer's future course of action.

Another Classification of Nuisances: Public vs. Private

Nuisances are also classified according to the number of people affected by the unreasonable use. When a person uses his property in such a manner as to interfere with the rights of a substantial number of people, this may characterize a "public nuisance." If he interferes with the rights of only a few people, a "private nuisance" is said to result.

Where a public nuisance is involved, it is more likely that an injunction will be granted. Since the court is weighing the interests of the parties, the interests of the public will likely be greater than those of a private individual.

The current trend in court decisions is to require the owner to modify the nuisance-causing operation if economically feasible. Ideally, this will relieve the plaintiff of the alleged inconvenient living conditions while permitting the defendant to continue to operate his modified feeding facilities.

Thus, the court may not close an operation if modifications significantly reduce odors, wastes and noise. However, odors, wastes and noise from feedlots may spread in many different directions. Thus, a farmer may have great difficulty "cleaning up" polluted air and water. For this reason agricultural enterprises must search for *preventive* solutions to this problem.

What Have the Courts Said About Livestock and Related Operations?

Several cases in the midwest serve to illustrate the effect of nuisance laws on various types of livestock operations. In CASE A, the operator of a 7,500-head feedlot was sued by the owner of a nearby dairy farm. A small creek originating near the feedlot also ran through the dairy farmer's land. The dairy farmer had a well near the creek which was his only source of water.

After a heavy three-day rain washed manure out of the feedlot and into a creek flowing through the dairyman's farm, the water in the dairy farmer's well turned brown and smelled strongly of manure. Cattle became sick after drinking this water. The farmer had substantial veterinary expenses and some cattle died. He was forced to start hauling water from other sources, and eventually had to abandon his dairy operation.

The dairy farmer sued the feedlot operator and the court awarded him $15,000 in "actual" damages (i.e., veterinary expenses, value of cattle lost, lost profits, etc.). However, the feedlot operator was not required to pay "punitive damages," evidently because he immediately took steps to avoid further pollution as soon as he learned the dairy farmer's well was contaminated.

This case illustrates some kinds of losses for which actual damages can be reimbursed. Several similar cases can be found in which farmers brought suit against cities which were dumping raw sewage into streams running by the farmer's land. Again in these cases, the farmers were paid actual damages incurred when cattle became sick from drinking water from the polluted stream.

Other recent cases illustrate that, under some circumstances,

the individual causing the nuisance may also be held liable for punitive damages. In CASE B, a poultry processing plant was the alleged offender. Here a nearby resident complained that the defendant processing company's three lagoons, all located within 300 to 500 feet of his personal residence, drained onto his property. More specifically, he complained of odors, flies and insects which accompanied the waste water and filth. In essence, he was arguing that their operation constituted a hazard to his family's health, and that the value of his property had been lowered. Evidently the jury agreed; they returned a verdict for $25,000 in actual damages *and* $15,000 in punitive damages.

Nuisance law controlled the outcome of both Case A and Case B. Thus, a logical question is: "Why were punitive damages granted in Case B but not in Case A?" You will recall that punitive damages have been defined as "the doing of a wrongful act intentionally without just cause or excuse."

This does not mean that you will be held responsible for punitive damages only if you intend to damage you neighbor. Rather, it means that you may be held liable for punitive damages if you could or should have foreseen (or if you knew) that the manner in which you conducted your operation might damage your neighbor. That is, if you intended *to do the act* which you should have known might interfere with your neighbor's rights, you may be held responsible not only for actual damages, but also for punitive damages.

With this background, compare the facts in the two cases. In Case A, an abnormally heavy rain contributed to the pollution problem. Thus, it was less likely that the feedlot owner could or should have foreseen that runoff from his feedlot might damage the dairy farmer. And, as soon as the feedlot operator learned of the problem he immediately took steps to try to solve it.

In Case B, the lagoons had a capacity to handle the waste from 11,000 birds per day, using 55 gallons of water per bird. However, the plant was actually processing 20,000 birds per day, using 70 gallons of water per bird. The Missouri Supreme Court stated that this was sufficient evidence on which the jury could award punitive damages. In other words, operating the plant at approximately twice the lagoon capacity could foreseeably overload the lagoons and creat uncomfortable living conditions for residents within 300 to 500 feet of the lagoons. Thus, legally this was "the intentional doing of a wrongful act without just cause or excuse."

How Can These Lawsuits Be Avoided?

Obviously, all livestock operators want to avoid being held liable for both actual and punitive damages if at all possible. Likewise, they do not want to see their buildings and equipment stand idle after being closed by an injunction.

Different legal problems exist in a suit for damages than in a suit for an injunction. The primary question in a damage suit is: "Did you damage your neighbor?" Whether you intended to do so or negligently did so is irrelevent to your liability, at least with regard to actual damages.

However, as previously noted, in a suit for an injunction, the court simply "weighs the interests" of the respective parties. This means there is no one thing which you can do to assure that the scales of justice will always tip in your favor. Thus, livestock operators must seek to prevent the problem from arising if possible.

The following discussion may be important to you in either preventing lawsuits or improving your position to make it more likely that the scales of justice will tip in your favor.

Comply with State and Federal Laws. A good way to avoid penalties resulting from a lawsuit is for livestock and poultry producers to comply with the laws and regulations in force. Both federal and state laws have been passed in recent years in an attempt to prevent pollution at its source. Agencies charged with enforcing laws and regulations of most interest to livestock and poultry include the federal Environmental Protection Agency (EPA) and a state agency, the Missouri Clean Water Commission.

The EPA has national responsibility for implementing the 1972 Water Pollution Act and amendments which include control of confined feeding operations. In Missouri, EPA works through the state regulatory agencies. So livestock producers should contact the Missouri Clean Water Commission when questions arise about animal waste management regulations.

Have an Approved Waste Management System. To comply with state and federal laws on water pollution related to confined feeding of livestock and poultry, it is necessary to have an approved waste management system for the confined feeding unit. The system approved by the Clean Water Commission includes three basic concepts.

(1) Systems must be designed so that there will be no direct discharge into surface or subsurface water as there is in industrial or municipal waste treatment systems.

(2) Systems must be designed and managed so that all animal wastes are collected and applied to the land in a controlled manner.

(3) A *letter of approval* will be issued by the Clean Water Commission upon completion of an approved system. Structures and facilities must be designed to handle the wastes produced. A description of what constitutes an approved system and the design data are provided in UMC Extension Division Miscellaneous Publication No. 232.

Good Management Important. The owner has the responsibility, according to the law, that no water pollution will originate from his property. If all the waste is applied to the land in an approved manner, then water pollution does not occur. But any waste management system designed so that there is no point source of discharge from the property will require attention and proper management from the operator and/or owner.

A properly designed, well managed livestock waste disposal system is not likely to create water pollution and odor problems or bring complaints from neighbors. But even a properly designed system can be mismanaged so that pollution results. If the owner permits overflow or fails to haul and spread at the proper time, a nuisance could be created. Thus, proper management is extremely important.

Letter of Approval may be Helpful. An important part of the Missouri Approach is the *letter of approval* issued by the Clean Water Commission. This letter is issued to all

individuals who apply and show sufficient evidence of having a waste management system that can be managed and operated so that water pollution problems will not be created.

The letter of approval offers incentives to the livestock producer. A record of his waste disposal system is placed on file, indicating that the wastes are being disposed of in an approved manner and are not causing water pollution problems.

Securing a letter of approval does not mean that a neighbor cannot bring suit or that the operation will automatically not be declared a nuisance. However, a letter of approval may be very important in the outcome of a lawsuit. If an operator has complied with all requirements of the regulatory agencies it is less likely that a jury would conclude that the plaintiff was intentionally injured by a wrongful act. In turn this would make it less likely that punitive damages would be assessed.

Select Site Away from Residences and Streams. As a practical matter, *locating a feedlot some distance from residences and streams may be the most important single thing in avoiding nuisance lawsuits*. Location is also the key to preventing stream pollution. In selecting a site, remember that an equitable action for an injunction is tried in a court of "good conscience." Thus, "do unto others as you would have them do unto you" is a good rule to follow. Would you like it if someone built a large confinement shelter for finishing hogs directly across the road from your home?

This situation occurred in one recent case when a 40 x 500 foot confinement turkey feeding shelter was erected directly across the road from a neighbor's house. The neighbor's request for an injunction was granted, and the shelter house is now idle. Only one flock of turkeys had been fed in the house, so the loss to the owner was substantial.

Does it Help if You Were There First? The feedlot is less likely to be held liable for damages to a nearby neighbor if he initiated his operation before such neighbor moved into the nearby residence. The fact that "you were there first" does not insure that you will always win a lawsuit, but *the jury is permitted to consider this fact* in their deliberations.

One can argue that a neighbor must accept the bad consequences of country life along with its benefits. In essence, this implies that a resident "moving to" a 500-head feedlot *assumes the risk* of undesirable living conditions. However, most courts would not grant a feedlot owner absolute protection under these circumstances for two reasons. First, if one "assumes the risk" of living in these conditions, this presumes that he realized how bad conditions were at the time he took residence. This may not be true, for example, if a person moves near the feedlot during the winter when little or no odor problem exists.

Second, even if a person realizes the quality of living conditions near a 500-head feedlot, is it fair to say he has no right to sue if the lot is increased in size to 1,000, 5,000 or even 10,000 head? Obviously, subsequent increases in size of the feedlot may potentially cause greater water and air pollution, and may also affect property values for nearby residents. Thus, the courts do not give the feedlot operator automatic protection just because he was there first, but do allow the jury to take this into consideration in arriving at their verdict. A jury likely would be unsympathetic toward a nearby neighbor who moved in one month and sued the feedlot operator the next.

Know Contractual Rights and Duties. When livestock are fed by farmers on a contract with a feed company (or processor), possibly either or both may be liable for damages in a nuisance action. Here, the terms of the contract may be a factor in determining which party is liable for such damages. If the contract creates an employer-independent contractor relationship, the farmer may be solely liable.

Thus, it is imperative that farmers know what type relationship is created by their contract. An attorney can analyze such contracts and make this determination. More information on employer-independent contractor relationships can be found in UMC Guide 451, "Farmer's Liability for Acts and Injuries of Employees."

County Zoning. In some situations zoning restrictions may help farmers avoid nuisance lawsuits while in other situations they may not help at all. An area zoned for agricultural production is less likely to attract residential development, thus lessening the likelihood of confrontation between farmers and rural residents. On the other hand, once a nuisance lawsuit arises the presence or absence of an agricultural zone may not be significant.

The courts have not yet gone so far to say that nuisance lawsuits cannot be brought against farmers in areas zoned for agricultural production. Many nuisance problems have arisen between farmers operating in an area zoned for agricultural use and rural residents living nearby in an area zoned for residential use. Furthermore, land zoned for agricultural use may be rezoned for residential use as the public interests shift from rural to more urban orientation.

To secure the maximum benefit from zoning, farmers must participate in the process of creating and re-examining zoning restrictions to insure representation of their interests.

Summary

There are circumstances where you can be held responsible for nuisance conditions arising from livestock confinement. Whenever your operation unreasonably interferes with the use and enjoyment of another person's property, a nuisance exists. Remedies for nuisance include damages, injunctions, or both.

To avoid creating liability for nuisances, farmers must take preventive steps. Proper management is of primary importance. Do not exceed the design capacity of feedlots. Lagoons should not be allowed to overflow. Animal carcasses should be disposed of properly and promptly.

Location and design of the livestock facilities are equally important. State and federal laws regulate aspects of larger livestock facilities. Compliance with pollution regulatory agencies will help reduce your liability for punitive damages. Once approval is acquired, proper management is necessary. Locating the facility away from residences and streams may be the most important single factor in avoiding nuisance lawsuits.

Nuisance conditions are easily created by livestock confinement where management becomes careless and fails to follow a "good neighbor" policy. Prevention is the key.

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The following boxed information is taken from Neuman and Lusby's Beef Cattle, 8th ed., pg. 300-301. This data, together with the material that follows it, completes the student reference for this lesson on governmental programs.

REGULATORY MEASURES AFFECTING CATTLE MARKETING

A wide variety of federal and state regulations designed to protect livestock producers, processors, and consumers alike and to ensure a free and unhampered competitive market are in force, and they directly and indirectly affect all segments of the beef cattle industry. In several instances regulations are in the process of being modified to meet the changing needs of several segments of the beef industry and alterations undoubtedly will continue, over time, as they have in the past. Beef producers should seek to remain current in their information concerning government regulations that relate directly to their operations.

Packers and Stockyards Act

The federal Packers and Stockyards Act, first enacted in 1921 and last amended in 1958, is administered by the Department of Agriculture. Its main purpose is to prescribe rules of fair competition and fair trade practices for all firms or persons engaged in livestock marketing and meat packing in interstate or foreign commerce. Included are dealers, stockyards, and auction markets, regardless of size, if they engage in interstate business. Some of the regulations under the act that provide marketing protection are: accurate weights, protection of a stockman's funds, full and accurate accounting, reasonable and adequate facilities at fair and nondiscriminatory rates, and sale of cattle under open competitive conditions. Firms or dealers covered by the act are required to post bond to ensure full payment for cattle sold, and the seller or buyer must be given a true written account of any sales or purchase transaction, including an itemized list of all charges. Many states have regulations concerning bonding that are even more stringent than those imposed by the federal government.

The regulations of this act are enforced by representatives of the Packers and Stockyards Administration, who visit markets, packing plants, and buying stations on a periodic but unscheduled basis. Such representatives are based in 15 area offices throughout the country. Anyone desiring to register a complaint to a Packers and Stockyards Administration supervisor should do so, in writing, as soon as possible but no later than 90 days after a transaction has been made.

Federal Meat Inspection Act

Federal meat inspection legislation was first enacted in 1890, mainly to assure the foreign importers of U.S. meat that the meat was not diseased. In 1891 and 1895, meat inspection was extended to include the inspection of live animals before slaughter. The first full-protection act, the Meat Inspection Act of 1906, included both antemortem and postmortem inspection along with other features, most of which remain in effect today. Only plants that dealt in interstate and foreign meat trade were covered.

In 1967 the Federal Meat Inspection Act, also known as the Wholesome Meat Act, was passed. This act effectively extended meat inspection to all plants, including those selling meat intrastate and even local abattoirs and freezer plants. Actually the act specified that states must enact legislation providing inspection standards and procedures at least equal to federal requirements by December 1, 1969, or they must submit to federal inspection of all meat and plants in each state. Most, but not all, states have enacted such legislation. In effect, the Wholesome Meat Act has brought all processors under a uniform and effective meat inspection service. Only farm-slaughtered beef, intended for consumption on the farm and not for sale to anyone, is legally excluded from inspection today.

Obviously the intent of this legislation is to safeguard the health of meat consumers by eliminating diseased and otherwise unfit meat from consumer channels. Sanitary slaughtering and processing practices are assured, and use of harmful additives is prevented. False and misleading labeling is made illegal.

All cattle must pass ante-mortem (live) inspection

by a veterinarian employed specifically for the purpose. During slaughter, all carcasses and viscera are inspected. If abnormal conditions are found, including severe bruising, the carcass is tagged and given more careful inspection. Certain parts may be trimmed—in instances of severe bruising and grub damage, for example. Carcasses that are passed unconditionally are stamped with a circular imprint, made with edible purple fluid, bearing the plant number and the abbreviated inscription "U.S. Insp'd and P's'd" and imprinted at numerous places on the carcass so that each wholesale cut carries the stamp.

Meat imported from foreign countries as fresh beef must meet the same requirements set up for domestically processed meat. Inspectors from the United States annually visit the foreign plants previously approved for slaughtering beef intended for the U.S. import trade. Other U.S. inspectors check incoming shipments as they arrive at domestic ports.

Buyers of slaughter cattle may purchase animals suspected of serious injury or disease on a basis of "subject to inspection," thereby agreeing to pay a specified price if the animal and its carcass pass complete or partial inspection.

The cost of federal meat inspection is borne by the government, and the inspection is done by personnel of the (USDA's) Consumer and Marketing Service. When states perform their own inspection, the federal government enters into cost-sharing arrangements, usually paying 50 percent of the cost and providing technical assistance.

Food, Drug and Cosmetics Act

The first Food, Drug, and Cosmetics Act, passed in 1938, provides for the Food and Drug Administration (FDA) and its regulatory functions. This agency is administered by the Department of Health and Human Services, not by the Department of Agriculture as some believe. The function of the FDA that directly affects cattlemen is that covering residues in beef carcasses, and even in manure, which might result from using additives such as hormones, pesticides, antibiotics, or other drugs. Feed manufacturers who process and sell fortified supplements to cattlemen must have approval of the FDA before selling feeds containing additives. The FDA may prosecute individuals for selling slaughter cattle containing tissue residues. FDA regulations governing withdrawal times for certain additives prior to slaughter have been mentioned elsewhere.

Animal Disease Control

The Animal Health Division of the Agricultural Research Service, U.S. Department of Agriculture, is responsible for administering the regulations relating to control and eradication of animal diseases. These include matters related to interstate movement of cattle and to import and export trade of live cattle. The records of meat inspectors at slaughter plants are available to disease control officials in the interest of detection of carrier animals and their source. Federal inspectors also function at stockyards and auction sales and they receive reports from practicing veterinarians. To prevent spread of communicable diseases, quarantines are imposed on farms, feedlots, and ranches when cases of certain diseases are detected, by whatever means, until the condition has been corrected. Cattlemen are sometimes caught up in an area quarantine, even though their own cattle may be free of the disease.

In extreme cases it may be necessary to destroy and dispose of all animals in an area, as has happened in local outbreaks of foot-and-mouth disease. Animals found to be infected with brucellosis are required to be slaughtered immediately, but carcasses must not be destroyed. A complete embargo may be imposed on live cattle or fresh meat from countries whose cattle are afflicted with certain diseases.

Space prohibits a more thorough discussion of the numerous federal and state regulations related to movement of cattle, quarantine, immunization programs, indemnities paid for animals destroyed, and penalties for violation of these regulations. All cattlemen owe it to themselves to keep abreast of the current status of the many regulatory measures in effect.

Beef Promotion and Research Act of 1985 - Contained in the 1985 Farm Bill, this program provides for a $1 per head checkoff or deduction each time cattle are sold. Funds are used for beef promotion, research, consumer information and industry information. Up to 50¢ per head is retained by the qualified state beef council for in-state promotion or investment in national promotion. All cattlemen, as well as importers, become investors in the fund.

The money is collected by auction markets, inspectors, order buyers, dealers, brand inspectors, packers or other buyers. A 113-member Cattlemen's Beef Promotion and Research Board oversees the program, which is managed by a 20-member Operating Committee consisting of 10 board members and 10 Beef Industry Council directors. Administration costs are limited to 5% of collection, and the penalty for violation may be as high as $5,000.

Information Sources

The producer can keep up-to-date on changing beef programs through a number of channels, including USDA offices, extension personnel and publications, veterinarians, beef organizations and associations, industry-related magazines and market officials.

Credits

Neumann, A.L.; Keith S. Lusby. Beef Cattle, 8th ed. New York: John Wiley & Sons, Inc., copyright (c) 1986, pg. 300-301. Reprinted by permission of John Wiley & Sons, Inc.

"The Beef Promotion and Research Program." Jefferson City, Mo.: Cattlemen's Beef Promotion and Research Board, 1986.

Two extension publications may be obtained for addresses of beef-related associations and organizations: "Information on Missouri's Beef Cattle Industry" (G10) and "Purebred Livestock Registry Associations" (G2906).

Beef Industry Organizations

The beef industry covers the production, processing and distribution of beef and the by-products of cattle. Each segment, operating quite independently of each other, has its own economic criteria and management problems. Each segment markets a different type of beef product (breeding animal, feeder, slaughter animal, carcass, fresh or cooked retail product).

Beef organizations have been originated to inform, promote, regulate, support research, compete effectively and influence others in areas directly affecting their businesses. Beef promotion and research are necessary if consumer demand for beef is to increase and new beef products are to be developed.

Producers of registered cattle should be aware of work done by purebred associations which may be beneficial to their operations. This activity includes breed promotion, current ancestry record keeping, promotion of youth involvement and activities, sire summary development and performance pedigree record keeping.

Credit

Taylor, Robert E. Beef Production and the Beef Industry: A Beef Producer's Perspective. Minneapolis, Minn.: Burgess, 1984, pg. 526.

Selection and Management of the Herd Bull

Herd sire selection is the most important decision a breeder will make. A sizable investment goes into buying a bull, but the influence on economic returns from the herd continues for years to come, especially if daughters are kept for replacements. The bull has two major functions in the herd. One is to settle a high percentage of cows in a relatively short time. The other is to sire calves of a desirable conformation with a genetic potential for rapid and efficient growth.

It is difficult, by visual appraisal, to tell how quickly and efficiently a beef animal will gain in the feedlot. Bulls should be performance-evaluated under the same conditions expected from their progeny. This helps identify those animals that gain well in the feedlot and those that are susceptible to unsoundness, such as founder or bloat.

The individual performance record can eliminate a lot of guessing in the selection of a potential herd sire. Pay close attention to the individual's adjusted 365-day weight and weight ratio. It is most desirable to select a bull that has above-average ratios for 205-day weight, post-weaning gain and adjusted 365-day weight. Ratios are obtained by arriving at the average performance of a test group for a specific trait and dividing this average into the bull's own performance record for that trait.

> EXAMPLE: Computing a ratio
> Compare the performance of 10 head of young bulls that are fed alike in a lot. By figuring a ratio for each, animals can be compared for yearling gains.
>
> Average weight for 10 bulls at 365 days = 1,100 lbs.
> Weight of bull No. 1 = 1,200 lbs.
>
> $\frac{1200}{1100} \times 100 = 109$ (ratio for bull No. 1)

Only 30-35% of a bull's weaning weight superiority is passed on to his progeny. However, 40-45% of his yearling weight superiority should pass on. Therefore, a bull's superiority is better determined at 365 days of age than at 205 days.

The actual yearling weight should be used with caution. For example, British breeds fed under practical management conditions should weigh around 1,000 pounds apiece, while larger breeds under similar conditions should weigh about 1,200 pounds. Look at the weight ratio within the group rather than between herds. Two bulls with the same genetic potential may vary in weight by 200 pounds just because of feeding and management in different environments.

To a commercial producer, the most important selection characteristics are weight and production efficiency. In the purebred industry, however, selection should include visual appraisal of muscling, structural soundness,

masculinity and frame. These are important for longevity and reproductive efficiency. Muscling is observed by evaluating the forearm, rump and round, especially the center of the round at the stifle joint.

The herd bull should be structurally sound in his feet and legs if he is going to be used in large breeding pastures or on rough terrain. Height at the shoulders is a better measure of size than weight because weight is influenced by fat. Research indicates that for each additional inch of height from weaning to one year of age one can expect an average 30 pounds of additional weight.

Reproductive organs, both internal and external, should be examined for abnormalities and indications of disease. Both testicles should be normal in size and consistency. There is a direct relationship between testicular size and sperm production. Watch for bulls with scrotal hernias or **monorchidism** and **cryptorchidism** (one or both testicles retained inside the body cavity). Both conditions are inherited and impair reproductive performance.

All bulls should have a semen evaluation prior to breeding to eliminate questionable breeders. Surveys show that 10-15% of bulls tested are unsatisfactory as potential breeders. Such an evaluation gives more assurance that the bull to be used will settle a high percentage of fertile cows and will help determine the potential breeding status of available bulls.

Individual Cow Records

Production records can be useful tools to help measure herd productivity, evaluate bull performance, identify high-producing cows, help cull low-producing cows, identify differences in the gaining ability of calves and yearlings, provide permanent annual records, select herd replacements, aid in management decisions and determine reproductive efficiency.

Specific records that should be kept to serve these purposes include records on management, the cow and the offspring. By analyzing these records, the source of many production problems can be located and corrected or eliminated.

Cow and management records can be used to evaluate the performance of both the cow and the bull. Cow performance records can indicate the expected performance of her offspring. Health records should also be kept on the cow to indicate vaccinations, sicknesses, injuries and treatments which may affect future production and health.

In addition, some management records should also be kept. A note should be made on a cow that does not breed easily to indicate a possible genetic or physical abnormality. If several cows show the same difficulty, the problem's source is more likely the bull. Calving dates should be recorded for calculating performance records in the offspring. Calving ease should be rated whenever possible, especially if there are difficulties. Many times calving difficulties are the result of structural or physical deformities that may lead to the loss of the cow, the calf or both.

A rating that many producers overlook is disposition. Cows with bad dispositions can result in damage to property, reduced production and injury to the individuals that come in contact with these cattle. Finally, the cow's body condition should be recorded periodically. A cow that is too thin or too fat may be inefficient in breeding or milk production, as well.

A cow's records should also include offspring records. Birth weights should be taken when possible because of the relationship to calving ease and for calculating performance records. Weaning and yearling weights and ratios indicate how well the cow produces and passes traits to her offspring. Any type of defect that may be genetic in nature should be noted for elimination from the herd. Finally, the grade of each offspring should be recorded on the cow's record to indicate offspring quality.

Credit

Beef Cow-Calf Manual (Manual 104). University of Missouri-Columbia: Extension Division, 1982, pg. 11-12, 20.

When to Breed for Best Returns

Producers generally breed their cows and heifers to calve in the spring or fall, depending on resources and facilities. Each system has its advantages, and producers must decide which system fits their situation best.

Spring calving - Cows and heifers are bred in June and July, which allows for cheaper wintering since dry cows require less feed. Later, these cows produce more milk since their lactation falls during times of lush grass growth rather than hay feeding. Summer grass usually eliminates the need for creep feeding calves, which can be sold in the fall to reduce winter feed needs. Retained calves are old enough to withstand the winter better than younger calves. Finally, cows are bred while on pasture, which generally increases conception rates if cows were in good condition at the winter's end and are bred before summer heat stress.

Fall calving - Breeding cows and heifers during December and January results in fall calving, which can also prove advantageous. Cows are usually in better condition at calving, producing stronger young. Calving during the fall grass regrowth allows them to meet nutritional requirements for good reproductive condition. In this system, cattle numbers are the largest during winter months when labor is usually more available. Fall calves are usually born in milder weather and are not subjected at a young age to midsummer problems such as severe heat, pinkeye and flies. Creep feeding is usually more profitable with these calves. At weaning time, calves can be sold during yearly market highs or put onto springtime grass for better gains.

Dual system - Some producers use a dual calving season which results in calves born in both the spring and fall. This system gives better utilization of facilities and feed resources. Bull power in this system is needed during four months of the year instead of two months. Labor is distributed more evenly over the year. In this system, heifers calve at $2\frac{1}{2}$ instead of two or three years of age. Finally, two calf crops permit more marketing options for the producer.

Crossbreeding Beef Cattle

A great deal of interest in crossbreeding has developed in recent years. Each producer should look objectively at crossbreeding and consider all of the advantages and disadvantages before deciding whether or not it is economical and suitable to the operation.

Crossbreeding has little affect on highly heritable economic traits. Therefore, superior performance-tested bulls are as essential to a crossbreeding program as they are to a commercial straight-bred program or a purebred operation.

Research indicates that calf weaning weights can be increased by at least 15-25% per crossbred cow exposed in a three-breed cross, compared to straight-breds. This is due to improved maternal traits resulting from hybrid vigor.

These traits include earlier puberty and conception, reduced postpartum interval, increased first estrus conception, lower embryonic mortality, reduced calf death losses from birth to weaning, faster calf growth rate and greater longevity of the crossbred cow.

In addition to the preceding advantages, crossbreeding is an opportunity for a producer to get something for nothing. This vigor allows the commercial producer to combine desirable traits from two or more breeds to achieve a better end product.

Selection Criteria for Crossbreeding

Selection criteria in crossbreeding are the same as in the purebred industry: select the highest performing animal for a given trait and mate the best to the best for a combination of abilities, plus a heterosis advantage. Heterosis can be defined as the percent change in a crossbred offspring as compared to the average of the two parent breeds.

Combining two mediocre parents gives a mediocre crossbred offspring, except for the heterosis effect. What should be considered in selecting breeds for specific crosses? Choose breeds that are superior for traits that will give greatest economic returns. Select breeds that give the greatest selection differential for specific traits. Use breeds that are acceptable to buyers and are least related, for maximum heterosis response.

Credit

Beef Cow-Calf Manual (Manual 104). University of Missouri-Columbia: Extension Division, 1982, pg. 14-15, 18-19.

Basic Facility Requirements

Pasture - The amount of pasture required is highly variable due to many factors involving the amount, digestibility and protein content of growth. Plant type has a large effect on the quality of the pasture since each type has a different composition which contributes differently to pasture quality. Plants used to make up a pasture can be grasses, legumes or a combination of the two. Soil fertility provides nutrients for plants to grow and mature. The area's climate provides an environment that can induce or restrict plant growth. The time of year also affects plant growth; cool-season plants produce best in the spring and fall, while warm-season plants produce best during the warmer days of summer. Finally, to obtain the best quality and production from a pasture, consider that as a plant matures it loses digestibility. A good grazing system can help prevent plant maturity. Each of these factors contributes to pasture quality; a range of 2-5 acres is needed per cow in Missouri.

Fences - For boundary and most cross fences, four-strand barbed-wire fences are recommended. For some cross fences, three-strand may be adequate. Woven wire plus one or two barbed wires makes a good fence but is higher in cost. For fences which must restrain driven cattle or in other high-stress areas, six- or seven-strand barbed-wire fencing or woven wire plus barbed wire may be needed. Some producers now use eight strands of a high-tensile strength smooth wire for fencing.

Electric fences are effective and low in cost. They are ideal for temporary fencing or adding to the effectiveness of a permanent fence. The light wires are easy to handle, but are not as visible to livestock or as durable as barbed wire. An electric fence can command respect from cattle. It must be checked frequently to assure that is working properly, however.

Normally, one wire is sufficient with an electric fence. Two wires may be needed for confining both cows and calves. One-wire fences are usually about 24 inches above the ground, although fence height is ultimately determined by animal size. Two-thirds the animal's height is sometimes used as a guideline.

Housing requirements - Weather conditions seldom affect beef cattle. Although warm, expensive barns can be used for cows, they are not needed except when calving during severely cold weather. Even though housing is unnecessary, good windbreaks can reduce the amount of feed and provide shelter for the herd in winter. Trees, a high board fence or a natural windbreak like hills provide protection under normal conditions. If accustomed to shade, cattle on grass during hot weather make more efficient gains if given shade, which may be provided by trees or artificial shades when trees are unavailable.

Special pens - To accomplish management goals, a beef producer may need to supply several specialized pens. These pens can serve dual purposes in some cases, while others may be needed at all times.

A goal of a successful cattleman should be a calving season of not more than 90 days since a uniform calf crop is worth more money and streamlines management efforts. The length of the calving season is determined by when and how long bulls run with the cows. During the remainder of the year, a bull or bulls must be kept away from the cow herd. Remember, bulls are large and play rough, so fences, gates and equipment must be heavy-duty.

To care for sick cattle, provide a pen away from other cattle. This pen should be easily accessible for close observation of the animals. Facilities for restraining animals and administering medication are also helpful.

A high-percentage calf crop is very important to the financial success of the operation. Providing a calving pasture will help save calves, and a pasture near--and preferably visible from--the house will save time, also. This pasture should have shade and windbreaks. Avoid creeks, overflow or open ponds. There should be direct access to an area with lights and working equipment if assistance is needed by the cow.

To achieve a high-percentage calf crop, it is important that all cows are bred. A breeding pasture or pen located near the homestead should be used for easy estrus detection. Use of these pens is important when using artificial insemination to determine the best time to breed. With natural breeding, cows that are not bred can be culled from the herd.

Diseases are most likely to infect the herd if cattle are obtained from several sources. The mixing and mingling of young animals often results in the spread of viruses since many of the cattle, especially young ones, have not developed immunity to all diseases.

When purchasing animals, a source history should be obtained. Maximum information should be gathered regarding past diseases and herd health programs in the herd. It may be necessary to isolate the new animals for one month to determine whether they are incubating a disease.

Credits

Bundy, Diggins and Christensen. Livestock and Poultry Production, 5th ed. Englewood Cliffs, NJ: Prentice-Hall, 1982, pg. 216.

Beef Cow-Calf Manual (Manual 104). University of Missouri-Columbia Extension Division, 1982, pg. 55, 68.

Protecting Cattle from Diseases and Parasites

To keep cattle free of diseases and parasites, some important steps should be taken. First, animals should be examined by a veterinarian for disease as they are brought into a herd. Only disease-free stock should be admitted into the herd. Any animal that may have been infected with a disease should be isolated before being brought into a herd. Animals known to have contagious infections should also be isolated. The breeding herd should be tested regularly for diseases such as brucellosis and tuberculosis.

Good sanitation greatly reduces disease and parasite infestation. Sanitation practices include draining lots and pastures of stagnant water; disinfecting equipment and housing regularly; eliminating manure piles and other materials which stimulate insect reproduction; and providing pure, clean water. Open wounds and navels of newborn calves should be disinfected. Cattle should always be vaccinated for diseases that are common in the area. Finally, insecticides provide cattle with protection from external parasites.

On the next several pages, charts have been developed to summarize Missouri problem diseases, their causes, symptoms, treatment and prevention.

Credit

Bundy, Diggins and Christensen. Livestock and Poultry Production, 5th ed. Englewood Cliffs, NJ: Prentice-Hall, 1982, pg. 340.

Causes, Symptoms and Treatment of Missouri's Major Cattle Diseases

Disease	Cause	Symptoms	Treatment/Prevention
BRSV (Bovine Respiratory Syncytial Virus)	Virus-caused; affects cattle of all ages as an individual disease or as part of the bovine respiratory disease complex (see BRD).	Two types. 1) Initial infection: rapid breathing, coughing, nasal and eye discharge, fever of 104-109F, slight swelling in jaw and neck area. Can strip hair-like projections lining respiratory tract and extensively damage surface cells. 2) Advanced: rapid worsening of early symptoms, depression and dehydration, death sometimes within 48 hours of first signs.	Treat with antibiotics, sulfa drugs, antihistamines and anti-inflammatory drugs. Vaccinate for prevention.
Bovine Virus Diarrhea (BVD)	Contagious virus	**Mild:** no symptoms to fever, coughing, nasal discharge, slow gains, rapid breathing or mild diarrhea. **Acute:** fever, difficult breathing, discharges from nose and mouth, coughing, ulcers on the mouth, lameness, dehydration, weight loss, diarrhea and abortions. **Chronic:** slow gains, rough hair coat, lameness.	No cure, but cattle can be treated for diarrhea and secondary infections. Vaccinate for prevention.
Brucellosis	Food or water contaminated by bacteria, contact with infected bull or with aborted fetus, introduction of infected animals to herd.	Abortions, infertility, retained afterbirth, weak calves and decreased milk production. Contagious to humans (undulant fever).	No cure. Isolation, testing, calf vaccination and eradication for prevention.

Bloat	Consumption of two much lush legume forage; a growth or obstruction of the esophagus that prevents the animal from expelling gases from the rumen.	Distension of the upper left side of the abdomen, rapid breathing and uneasiness, suffocation if intense enough pressure.	Walking the animal if pressure is not too great, releasing gas by stomach tube or large needle. Prevent by controlling legume intake.
Calf scours	Virus, bacteria, lack of colostrum, dirty feeding equipment, too much milk.	Acute: diarrhea and sudden death. Chronic: diarrhea, loss of weight and death after several days.	Antibiotics and sulfa drugs for cows. Special feeding formula for calves. Good sanitation for prevention.
Clostridial diseases (includes blackleg; malignant edema; novyi; sord; red water; and enterotoxemia B, C or D)	Highly resistant bacteria usually enters body through mouth and wounds from contaminated soil, hay, feed. Can be dormant; grows when oxygen is absent in soil or in an injured area of an animal where cells have been destroyed.	Dependent on type of infected tissue; usually culminates in rapid death.	Massive doses of antibiotics in early stages. Vaccination for prevention.
Fescue toxicity (summer slump and fat necrosis)	Summer slump: fungal endophyte in tall fescue. Other types: unknown.	Reduced feed consumption, decreased rate of gain or milk production, rough coat, increased respiration and temperature, nervousness.	Remove from tall fescue, feed some grain in diet. Prevention: mix legumes with fescue, reseed pasture with endophyte-free variety of fescue, avoid heavy fertilizer applications.
Fescue foot	Stockpiled fescue grazed in fall or winter.	Lameness in rear feet, redness just above hoof line, extremities may slough off in some cases.	Feed some grain in diet. Prevention: mix legumes with fescue, reseed pasture with endophyte-free variety of fescue, avoid heavy fertilizer applications.

Disease	Cause	Symptoms	Treatment/Prevention
Foot rot	Bacteria, fungi and other organisms that enter foot wound.	Lameness, redness between claws accompanied by foul odor, loss of appetite, fever and depression, death.	Massive dosages of penicillin or wide-spectrum antibiotics; sulfa drugs; cleaning and treating of foot. Good sanitation for prevention.
Founder (laminitis)	Overeating	Lameness, inflammation between the bony part of the foot and the hoof wall; toes that grow long and turn up.	Trim toes and sell for slaughter. Control feed intake for prevention.
Grass tetany	Magnesium deficiency, especially with rapidly growing cool-season grasses.	Excitement, coordination loss, blindness, appetite loss and sometimes death.	Inject calcium and magnesium solution. Prevention: mix legumes in the pasture; supplement with magnesium; or feed alfalfa, clover or other legumes.
Hardware disease	Sharp object puncturing the wall of the reticulum where the object or the infection affects surrounding organs.	Appetite loss, arched back, fever, stiffness and reduction in cud chewing.	Surgery. Prevention: object-free feed or a magnet placed in the cow's stomach.

Infectious Bovine Rhinotracheitis (IBR)	Virus; often the initial cause of shipping fever.	**Respiratory IBR (red nose):** fever, nasal discharge, foaming at the mouth, breathing through the mouth, weight loss, inflamed nose. **Genital IBR:** (cows) inflamed vagina, swollen vulva, pustules in the vagina and pustular discharge; (bulls) inflamed sheath and penis, lesions forming on penis accompanied by pus-like discharge. **Conjunctival IBR:** A clear discharge from the eye that becomes pus-infected similar to pinkeye. Abortions with any of the above types, even without additional symptoms. **Encephalitic IBR:** Incoordination, depression, convulsions, death.	None. Antibiotics and sulfonamides for secondary infections. Vaccination with modified live virus for prevention.
Johne's (pronounced Yohneez) disease (paratuberculosis)	Organisms in pastures, water sources and feed bunks contaminated by droppings from infected animals.	Long incubation period; disease usually not detectable in animals under two years old. Intermittent diarrhea, weight loss and eventual death.	No effective treatment. Prevention by control of animals entering the herd.
Leptospirosis	Leptospira bacteria in feed and water; carried by wild animals.	Mild cases: no symptoms. Acute cases: fever, rapid breathing, appetite loss, stiffness, bloody urine, jaundice, diarrhea or abortions. Death rate 5-15%. Contagious to humans.	Streptomycin. Prevention: good sanitation and yearly vaccinations.

Disease	Cause	Symptoms	Treatment/Prevention
Lumpy jaw	Organism enters wounds in the mouth.	Two types (consult veterinarian to diagnose). Chronic: swelling and abscess around jaw bone or bony tissues of head. "Wooden tongue:" affects soft tissues and lymph nodes.	Early treatment critical.
Nitrate poisoning	Too much nitrate in feed or water, especially with crops grown under drought conditions.	Difficult breathing, fast pulse rate, abortions and frothing at the mouth.	Antidote tablets. Feed analysis for prevention.
Pinkeye (infectious keratitis or keratoconjunctivitis)	Bacteria carried by insects (usually face flies); virus with the form of IBR; severity and susceptibility affected by bright sunlight, dust, pollen and Vitamin A deficiency.	Watery eyes, swelling and ulcerations of the cornea which may spread from one eye to the other.	Apply antibiotics and sulfa drugs to the eyelid frequently and possibly patch the eye; vaccinate to lessen severity. Prevention by insect control and selection of animals with pigmented eyelids.
Pneumonia	Infection in the lungs.	Labored, rapid breathing; coughing; fever; weakness and appetite loss.	Antibiotics and sulfa drugs. Prevention by good sanitation and draft control.
Ringworm	Fungus	Round, scaly patches which lack hair. Contagious to humans.	Iodine tincture or fungicides. Prevent with good sanitation.
Shipping fever (PI-3, pasteurella, IBR)	Possibly by a combination of stress, viral infection and bacteria infection.	Fever, depression, drooping head and ears, nasal discharge, watery eyes, weight loss, diarrhea, appetite loss, difficult breathing, coughing and development of pneumonia.	Antibiotics and sulfa drugs. Prevention by vaccination and management to reduce stress.

Sorghum and sudangrass poisoning	Caused by high content of hydrocyanic or prussic acid in these plants under some conditions.	Rapid breathing and death.	Intravenous injection of sodium thiosulfate and methylene blue. Prevent eating of wild cherry foliage or sorghum during severe drought or after frosts.
TEME (Thrombo-embolic Meningo-encephalitis)	Same bacteria which causes BRD.	**Early:** lameness, reluctance to move, stiffness with "knuckling" of the fetlocks, blindness. **Advanced:** muscle tremors and paddling movements of down cattle; death.	Antibiotics in early stages. Vaccinate for prevention.
Venereal diseases (vibriosis and trichomoniasis)	Vibriosis: bacteria. Trichomoniasis: one-celled animal. Spread by breeding.	Infertility, abortions and irregular heat periods in cows. Lab testing necessary for diagnosis.	**Vibriosis:** Cows naturally rid themselves of the disease within a year after breeding, retaining immunity. Use antibiotics to treat bulls. Prevent through vaccination. **Trichomoniasis:** no cure. Slaughter recommended for control.
Warts	Contagious; caused by a virus that spreads through contact.	Hard or soft warts on the head, neck, shoulders, udder or teats of cattle.	Vaccination

Credits

Taylor, Robert E. Beef Production and the Beef Industry: A Beef Producer's Perspective. Minneapolis, Minn.: Burgess, 1984.

Drover's Journal Magazine. Shawnee Mission, Kan.: Vance Livestock Publications, October 1986.

Problems with Cattle on Pasture

Bloat is a condition in which the rumen becomes filled with gases that the animal cannot expel. It may be caused by a growth or other obstruction in the esophagus but is more often caused by feeds that ferment rapidly in the rumen, causing large amounts of gas to form. Consumption of lush legumes is one of the most common causes of bloat. Legume use in grass pastures has increased greatly because of high nitrogen prices and research showing that grass-legume mixtures give more economical gains than grass alone.

Problems with legume-induced bloat are dependent on pasture management and the kind of growing season. Clover-grass mixtures usually present no problem if the clover content is kept below 50%. Bloat can be reduced by feeding an anti-foaming agent, providing an alternative roughage or selecting against individuals that have the tendency to bloat.

Poisonous plants are a major economic loss to the cattle industry since 3-5% of cattle are affected each year. These losses result from death, reduced gains, treatment costs, abortions and birth defects. Preventive measures include developing grazing plans to prevent poisonous plant ingestion, avoiding overgrazing, controlling poisonous plant intake where feasible, and preventing undue stress (hunger, thirst or lack of salt and other necessary minerals).

Rapidly growing sorghum, sudangrass and sorghum-sudan hybrids become dangerous feeds for cattle because of their high **prussic acid** content under certain conditions. Frost or severe drought appears to promote the formation of poisonous material in these forages, especially during the regrowth after the main crop has been harvested. Grazing sorghum stubble fields should be done with extreme caution so that the first signs of illness are detected and animals are promptly removed from the field.

The number of **nitrate poisoning** cases has increased with heavier use of nitrogen fertilizer and thicker planting rates. A number of climatic factors can be responsible for abnormal nitrate accumulation, such as drought, excessive cloudiness, uneven rainfall distribution and self-shading from very thick stands. Corn or sorghum cut for green chop, small grain pastures, sudangrass and sorghum all cause difficulty at times.

Fescue toxicity is a serious problem with cattle throughout tall fescue growing areas in the eastern U.S. where grass is the animal's principle dietary ingredient. It is often imprecisely referred to as "summer slump" because of more extreme symptoms which occur during warm weather. Poor animal gains, reduced conception rates, heat intolerance, failure to shed the winter coat, elevated body temperature and nervousness characterize this syndrome. Lameness and the sloughing of feet and tail tips have also been associated with grazing tall fescue. Cattle with fescue foot may stand in water more than normal or show stiffness when first standing up.

Various **deficiencies and imbalances** can occur, but the one of the most common is grass tetany. This problem is due to a magnesium deficiency in the blood serum and is similar to milk fever. The incidence of grass tetany has increased with greater use of cool-season grasses. Cows at the peak of milk production in the six-week postpartum period have the greatest incidence of grass tetany. Cool, cloudy, windy, rainy weather appears to affect both grass and cattle. At temperatures of 20-40F, grass is less capable of assimilating magnesium from the soil. These weather conditions are also stressful to cattle. Lush, rapidly growing grass may also be deficient in magnesium.

Roughages for Cattle on Pasture

Available roughages include hay, by-products, crop residues and fresh materials such as green chop and silage. Hay, the most popular roughage, is forage that has been dried, harvested and stored for later feeding when other forages are unavailable. By-products from local industries, such as dried brewer's grains, may provide inexpensive roughages for cattle.

Pasturing available stalk fields with dry cows or large feeder animals is profitable for most producers. While these residues are low in protein, they furnish adequate levels of energy. The cow is a selective grazer, eating leaves, tassels, husks and grain first, leaving stalks and cobs until last. Much of the coarser material is trampled back into the soil and more palatable material is recycled through manure. There is little fertilizer nutrient loss under this type of grazing system.

Feeding green chop is another system of pasture utilization or management. This system involves cutting the forage and bringing it to a dry lot or other convenient feeding location. Self-unloading wagons, field choppers and self-feeding wagons have made it possible to handle large amounts of green feed with a minimum of labor, which has stimulated the use of green chop.

Silage is produced from green forage crops which are compressed and stored under oxygen-free conditions in upright or horizontal silos. The feed is preserved through a process of fermentation which prevents mold and other spoilage from occurring. The most common crops used for silage are corn, sorghum, grasses, legumes and some small grains. Silage's moisture content is usually 60-75%. Haylage is a forage which is between hay and silage in moisture content (40-60%).

Roughage Quality

Roughage quality is determined by a combination of digestibility and protein content. High-quality hay is green, fine stemmed and free of weeds and trash. It has been dried and handled in a manner which preserves the most leaves, natural green color, nutrients and dry matter. Good hay, however, cannot be produced from poor quality forage, regardless of handling technique. Consequently, the task of producing good hay begins long before harvest time.

Silage should be harvested to make efficient use of storage and to maximize digestible nutrients and dry matter per acre. The harvest time also influ-

ences storage efficiency by minimizing seepage losses and maximizing dry matter stored per cubic foot of storage space.

Pasture Quality

Any factor that affects plant growth in a pasture affects quality. Grass can be a money-making crop on acres where row crops cannot be grown. Increasing the income received from grass usually requires spending some money initially on fertilizer and perhaps reseeding. More animals must then be handled on a given acreage to justify the improvement.

Most farms have some land that should remain in grass. Examples include land that is steep, rocky or subject to drought. Annual precipitation, sometimes associated with other climatic influences, can have marked effects on forage supply. The drought often associated with overgrazing can reduce the desirable plant species, which affects future forage supply even in years of adequate precipitation. Extended drought periods of longer than a year usually result in herd reductions, the need for additional (often high-priced) feed or moving cattle to areas with more abundant feed supplies.

Many old pastures produce below their capacity due to overgrazing, weeds or low soil fertility. Restoring the pasture involves a combination of practices. The elimination of overgrazing and control of weeds comes first. Topdressing with fertilizer may be added if a soil test shows that it is needed to produce more pounds of animal per acre.

Nitrogen can be supplied in a fertilizer topdressing or by seeding a legume into the grass. Bacteria on legume roots take nitrogen out of the air and make it available to the plants. Research indicates that a healthy grass-legume mixture will produce as much forage as grass topdressed with 100 pounds of nitrogen. Legumes must make up 35% or more of the stand in order to get this increased yield.

Weeds reduce a pasture's yield. Most weedy pastures result from overgrazing or a lack of grass competition. Weed problems on a new planting can be reduced by using a companion crop of small grains and planting during the fall. Mowing can be helpful as a last resort.

A pasture should be allowed to grow for about three weeks in the spring before it is grazed. Fall-seeded pastures can be grazed the following spring and summer but should not be grazed after mid-September so that roots can build up strength for the winter. Legume pastures should be rested for about 30 days before the fall freeze. After a heavy freeze, the pasture can be used again.

Winter hay supplies must be fitted to the individual program. Purchased hay is generally expensive; a more economical method is to cut and store hay from the farm. A June-harvested pasture should be allowed to rest in July and August. Another solution is to topdress a pasture in August and graze it in the fall and winter. Stored hay can then be used as a supplement. Tall fescue is one of the better grasses for fall and winter grazing.

Rotation grazing can be very helpful in achieving top production from a pasture. Cross-fencing forces cattle to graze one area completely before moving to another area. Portable electric fencing is often used for cross-fencing.

Credits

Bundy, Diggins and Christensen. Livestock and Poultry Production, 5th ed. Englewood Cliffs, NJ: Prentice-Hall, 1982, pg. 355-356.

Delorit, Richard J., and Henry L. Ahlgren. Crop Production, 3rd ed. Englewood Cliffs, N.J.: Prentice-Hall, Inc., pg. 497, 510, 511.

Neumann, A. L.; Keith S. Lusby. Beef Cattle, 8th ed. New York: John Wiley & Sons, Inc., 1986, pg. 270, 271.

Taylor, Robert E. Beef Production and the Beef Industry: A Beef Producer's Perspective. Minneapolis, Minn.: Burgess, 1984, pg. 308, 464, 486, 487, 492.

University of Missouri-Columbia Extension Division agricultural publications

a) G4600: Growing and Using Grass on Small Farms (1980)
b) M104: Beef Cow-Calf Manual (1982)